CLAIMS

We claim:

1. A process of producing a coated surface on a substrate, comprising

a) providing a substrate; and

b) plasma depositing an aziridine compound onto the substrate to produce at least one aziridine-coated surface on the substrate, wherein the aziridine compound has a functional group that is linked to the aziridine and that is susceptible to fragmentation and recombination, with the proviso that the functional group is not silane or siloxane, and, if the nitrogen atom of the aziridine is attached to hydrogen, then an alkyl pendent to the carbon of the aziridine has 4 or more carbon atoms.

2. The process of claim 1 wherein the aziridine compound has at least one functional group selected from the group consisting of allyl, alkoxy, alkylene, aryl, ester, ether, ethylene glycol, oligoethylene glycol, and acryl.

3. The process of claim 1 wherein the aziridine compound has an alkylene group.

4. The process of claim 3 wherein the aziridine compound has an acryl group.

5. The process of claim 4 wherein the aziridine compound has a molecular weight of 600 or less.

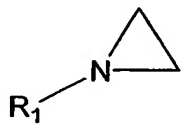
6. The process of claim 4 wherein the aziridine is linked to the acryl group by a linker selected from the group consisting of alkyl, alkylene, alkylene oxide, alkyl diols, and combinations thereof.

7. The process of claim 6 wherein the linker is polypropylene oxide.

8. The process of claim 6 wherein the linker is polyethylene glycol.

9. The process of claim 6 wherein the linker comprises polyethylene glycol and polypropylene oxide.

10. The process of claim 1 wherein the aziridine compound is

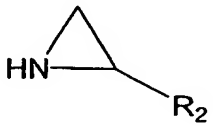


(I)

wherein R_1 is selected from the group consisting of a substituted or unsubstituted alkyl, alkoxy, alkenyl, alkinyl, aryl, arylalkyl, cycloalkylalkyl, cycloalkenyl, heterocyclic, heteroaryl, heteroarylalkyl, acrylate, alkylacrylate, alkylacrylate esters, alkylester, alkylether, alkylcarbonyl, fluorocarbon, ethylene glycol, oligo ethylene glycol groups, and combinations thereof.

11. The process of claim 10, wherein the substitution group is selected from the group consisting of a halogen, C_1-C_{22} alkyl, nitro, cyano, aryl, thiol, cycloalkyl, fluorocarbon, ethylene glycol, oligoethylene glycol and heterocyclic groups.

12. The process of claim 1 wherein the aziridine compound is

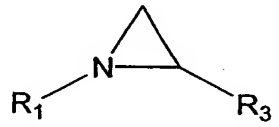


(II)

wherein R_2 is selected from the group consisting of a substituted or unsubstituted alkyl having 4 or more carbon atoms, alkoxy, alkenyl, alkinyl, aryl, arylalkyl, cycloalkylalkyl, cycloalkenyl, heterocyclic, heteroaryl, heteroarylalkyl, acrylate, alkylacrylate, alkylacrylate esters, alkylester, alkylether, alkylcarbonyl, fluorocarbon, ethylene glycol, oligo ethylene glycol groups, and combinations thereof.

13. The process of claim 12, wherein the substitution group is selected from the group consisting of a halogen, C_1-C_{22} alkyl, nitro, cyano, aryl, thiol, cycloalkyl, fluorocarbon, ethylene glycol, oligoethylene glycol and heterocyclic groups.

14. The process of claim 1 wherein the aziridine compound is



(III)

wherein R_1 and R_3 are selected from the group consisting of a substituted or unsubstituted alkyl, alkoxy, alkenyl, alkinyl, aryl, arylalkyl, cycloalkylalkyl, cycloalkenyl, heterocyclic, heteroaryl, heteroarylalkyl, acrylate, alkylacrylate, alkylacrylate esters, alkylester, alkylether, alkylcarbonyl, fluorocarbon, ethylene glycol, oligo ethylene glycol groups, and combinations thereof.

15. The process of claim 14, wherein the substitution group is selected from the group consisting of a halogen, C_1-C_{22} alkyl, nitro, cyano, aryl, thiol, cycloalkyl, fluorocarbon, ethylene glycol, oligoethylene glycol and heterocyclic groups.

16. The process of claim 4 wherein the aziridine compound is 2-(1-aziridinyl) ethyl methacrylate.

17. The process of claim 1 wherein the substrate is selected from the group consisting of polyethylene terephthalate, polycarbonate, polymethacrylate, silicone, polytetrafluoroethylene, polyurethanes, polybutadienes, epoxies, polystyrenes, polybutyrates, hydroxy apatites, ceramics, glass, and metals.

18. The process of claim 1 wherein the substrate is etched with oxygen before plasma depositing the aziridine compound.

19. The process of claim 1 further comprising the step of coating the aziridine coated surface with a biopolymer.

20. The process of claim 19 wherein the biopolymer is selected from the group consisting of protein, heparin complex, polysaccharide, phosphonic acid, and nucleic acid.

21 The process of claim 20 wherein the polysaccharide is hyaluronan, alginate, or carboxymethyl cellulose.

22. The process of claim 20 wherein the protein is collagen, laminin or albumin.

23. The process of claim 20 wherein the nucleic acid is DNA, RNA or antisense material.

24. A coated substrate produced by the process of claim 1.

25. A coated substrate produced by the process of claim 16.

26. A coated substrate produced by the process of claim 19.

27. A device comprising:

(a) a substrate; and

(b) a film on said substrate, wherein said film is plasma deposited with an aziridine compound, wherein the aziridine compound has a functional group that is linked to the aziridine and that is susceptible to fragmentation and recombination, and with the proviso that the functional group is not silane or siloxane, and, if the nitrogen atom of the aziridine is attached to hydrogen, then an alkyl pendent to the carbon of the aziridine has 4 or more carbon atoms.

28. The device of claim 27 wherein the aziridine compound has at least one other functional group selected from the group consisting of allyl, alkoxy, alkylene, aryl, ester, ether, ethylene glycol, oligoethylene glycol, and acryl.

29. The device of claim 28 wherein the aziridine compound has an alkylene group.

30. The device of claim 28 wherein the aziridine compound has an acryl group.

31. The device of claim 27 wherein the aziridine compound has a molecular weight of 600 or less.

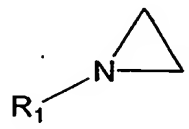
32. The device of claim 27 wherein the aziridine is linked to the acryl group by a linker selected from the group consisting of alkyl, alkylene, alkylene oxide, alkyl diols and combinations there.

33. The device of claim 32 wherein the linker is polypropylene oxide.

34. The device of claim 32 wherein the linker is polyethylene glycol.

35. The device of claim 32 wherein the linker comprises polyethylene glycol and polypropylene oxide.

36. The device of claim 27 wherein the aziridine compound is

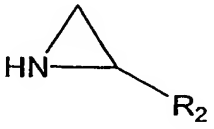


(I)

wherein R_1 is selected from the group consisting of a substituted or unsubstituted alkyl, alkoxy, alkenyl, alkinyl, aryl, arylalkyl cycloalkylalkyl, cycloalkenyl, heterocyclic, heteroaryl, heteroarylalkyl, acrylate, alkylacrylate, alkylacrylate esters, alkylester, alkylether, alkylcarbonyl, fluorocarbon, ethylene glycol, oligo ethylene glycol groups, and a combination thereof.

37. The device of claim 27, wherein the substitution group is selected from the group consisting of a halogen, C_1-C_{22} alkyl, nitro, cyano, aryl, thiol, cycloalkyl, fluorocarbon, ethylene glycol, oligoethylene glycol and heterocyclic groups.

38. The device of claim 27 wherein the aziridine compound is



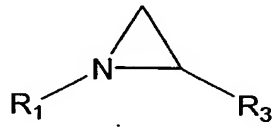
(II)

wherein R_2 is selected from the group consisting of a substituted or unsubstituted alkyl having 4 or more carbon atoms, alkoxy, alkenyl, alkinyl, aryl, arylalkyl

cycloalkylalkyl, cycloalkenyl, heterocyclic, heteroaryl, heteroarylalkyl, acrylate, alkylacrylate, alkylacrylate esters, alkylester, alkylether, alkylcarbonyl, fluorocarbon, ethylene glycol, oligo ethylene glycol groups, and a combination thereof.

39. The device of claim 38, wherein the substitution group is selected from the group consisting of a halogen, C_1-C_{22} alkyl, nitro, cyano, aryl, thiol, cycloalkyl, fluorocarbon, ethylene glycol, oligoethylene glycol and heterocyclic groups.

40. The device of claim 27 wherein the aziridine compound is



(III)

wherein R_1 and R_3 are selected from the group consisting of a substituted or unsubstituted alkyl, alkoxy, alkenyl, alkinyl, aryl, arylalkyl cycloalkylalkyl, cycloalkenyl, heterocyclic, heteroaryl, heteroarylalkyl, acrylate, alkylacrylate, alkylacrylate esters, alkylester, alkylether, alkylcarbonyl, fluorocarbon, ethylene glycol, oligo ethylene glycol groups, and a combination thereof.

41. The device of claim 40, wherein the substitution group is selected from the group consisting of a halogen, C_1-C_{22} alkyl, nitro, cyano, aryl, thiol, cycloalkyl, fluorocarbon, ethylene glycol, oligoethylene glycol and heterocyclic groups.

42. The device of claim 27 wherein the aziridine compound is 2-(1-aziridinyl) ethyl methacrylate.

43. The device of claim 27 further comprising a pharmaceutical or therapeutic agent immobilized onto said film.

44. The device of claim 43 wherein said pharmaceutical or therapeutic agent is a member selected from the group consisting of anti-allergenics, anti-bacterials, anti-virals, anti-fungals, anti-inflammatories, antiplatelets, antithrombotics, anesthetics, anti-proliferatives, genetic materials and mixtures thereof.

45. The device of claim 44 wherein the genetic materials are selected from the group consisting of DNA, RNA and antisense material.

46. The device of claim 27 wherein the film is covered by a biopolymer layer.

47. The device of claim 46 wherein the biopolymer is selected from the group consisting of protein, heparin complex, polysaccharide, phosphonic acid, and nucleic acid.

48. The device of claim 47 wherein the polysaccharide is hyaluronan.

49. The device of claim 46 wherein a pharmaceutical or therapeutic agent immobilized onto said biopolymer layer.

50. A method of preventing cell adhesion on a substrate comprising the plasma deposition of aziridine on the substrate to form an aziridine film, wherein the aziridine compound has a functional group that is linked to the aziridine and that is susceptible to fragmentation and recombination, and with the proviso that the functional group is not silane or siloxane, and, if the nitrogen atom of the aziridine is attached

to hydrogen, then an alkyl pendant to the carbon of the aziridine has 4 or more carbon atoms.

51. The method of claim 50, further comprising the application of a biopolymer layer on the aziridine film.

52. The method of claim 51 wherein the biopolymer is selected from the group consisting of protein, heparin complex, polysaccharide, phosphonic acid, and nucleic acid.